shifts in AP and SI directions, both with the largest shift of ± 1.2 cm, while the corresponding result for the relative shifts in the LR directions where +0.5 cm (Figure 1b). The number of shifts > ± 0.3 cm was 31 %, 28% and 12 % in the AP, SI and LR directions respectively. The systematic (Σ) error based on the difference between the bony and soft tissue registration were 0.4 cm, 0.3 cm and 0.2 cm in the AP, SI and LR directions respectively. The corresponding random (σ) errors were 0.2 cm (AP), 0.2 cm (SI) and 0.1 cm (LR). Using bony structures as surrogate for the tumour (ITV) requires an AP margin of 1.1 cm, SI margin of 0.9 cm and LR margin of 0.5 cm (Table I), calculated according to the Van Herk formula (Seminars in Radiation and Oncology, 2004).

Table I: The group mean, systematic (∑) and random (σ) errors based on the difference between bone- and tumour registrations.
The margin is calculated by the formula: $2.5 * \sum + 0.7 * \sigma$.
(van Herk, 2004)

Parameter	AP (cm)	SI (cm)	LR (cm)
Mean (group)	-0.1	-0.1	0.0
∑	0.4	0.3	0.2
σ	0.2	0.2	0.1
Margin	1.1	0.9	0.5

Conclusions: Large differences between bony and soft tissue registrations were revealed, and the use of bony structures as a surrogate for the tumour would result in a setup margin of 1.1 cm, 0.9 cm and 0.5 cm in AP, SI and LR directions, respectively. We concluded that the bony structures in the spine seem to be inappropriate as a surrogate for the tumour in lung stereotactic radiotherapy treatments.

EP-1670

Does the use of an endorectal balloon stabilise the rectum for patients receiving prostate radiotherapy?

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Purpose/Objective: In prostate external beam radiotherapy (EBRT), rectal distension and motion can affect the position of the prostate due to the close anatomical relationship. The greatest extent of motion is generally seen in the anterior/posterior plane and is strongly correlated with rectal filling. This is of particular relevance as the majority of tumour foci are found at the posterior of the prostate gland. The aim of this study is to establish if the use of an endorectal balloon (ERB) (QLRAD Rectal Pro 75) during radical EBRT stabilises the rectum compared to no bowel intervention.

Materials and Methods: Six patients were recruited into a local feasibility study. Patients received standard radical EBRT (60 Gy in 20 fractions) using volumetric modulated arc therapy (VMAT) with routine on-treatment cone beam CT (CBCT) imaging. No bowel preparation was given. Alongside routine practice, the patient had an ERB inserted at the initial planning scan then once per week immediately after treatment delivery. The ERB was not in-situ during EBRT. Study images were obtained at the initial planning scan (1 CT image with and without ERB), and once per week during the treatment course (4 CBCTs with and without ERB). This allowed the patient to act as their own control to enable comparison of rectal stability with or without an ERB in-situ. All scans were exported to the Pinnacle (version 9.6) treatment planning system. For non-ERB images the rectum was outlined from 1 cm inferior to 1cm superior to the planning target volume. For ERB images the balloon was outlined. Conformity of outlined volumes between the initial planning scan and the CBCT scans was assessed using the Dice similarity coefficient (DSC: 1=unity, 0=no overlap of volumes). Centroid shift (geometric centre of mass) was calculated to assess gross volume movement.

Results: The DSC values (mean ± standard deviation) for ERB and non-ERB volume comparisons were 0.84±0.06 and 0.67±0.07 respectively, and centroid shifts (mean ± standard deviation) were 0.57±0.27 cm and 0.62±0.34 cm respectively. Centroid shifts in the individual A/P, R/L and S/I planes are shown in the table. Centroid shifts in the individual A/P, R/L and S/I planes are close to the limiting spatial resolution of the images (planning: 1x1x2.5 mm; CBCT: 1x1x1 mm).

	DSC	Centroid shift (Total) (cm)	Centroid shift (R/L) (cm)	Centroid shift (A/P) (cm)	Centroid shift (S/I) (cm)
ERB	0.84 ± 0.06	0.57 ± 0.27	0.24 ± 0.20	0.24 ± 0.15	0.37 ± 0.30
Non-ERB	0.67 ± 0.07	0.62 ± 0.34	0.20 ± 0.19	0.23 ± 0.15	0.47 ± 0.35

Conclusions: DSC results suggest that the use of an ERB helps to stabilise the shape of the rectum during prostate EBRT. However, the use of an ERB did not improve the positioning of the rectum, since the centroid shifts from the initial planning scan to the CBCT images were already small whether an ERB was in-situ or not. The main limitations of the study are the small number of patients involved, and the use of different regions as metrics in the ERB (balloon) and non-ERB (rectum) images.

EP-1671

Accuracy evaluation of the Optical Surface Monitoring System on EDGE linear accelerator for patient positioning

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Purpose/Objective: Frameless stereotactic radiosurgery (SRS) requires dedicated systems to monitor the patient position during the treatment to avoid target under-dosage due to involuntary shift. The new EDGE linear accelerator